Idiopathic Scoliosis Treatment Using the Pettibon Corrective Procedures: A Case Report

Mark W Morningstar, DC[1], Megan N Strauchman, DO[2], Greg Gilmour, DC[3]

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1 Private practice of chiropractic, Grand Blanc, MI
2 Genesys Regional Medical Center, Grand Blanc, MI
3 Private practice of chiropractic, New Baltimore, MI

For Correspondence:
Mark W Morningstar, DC
2393 Wildwood Circle
Grand Blanc, MI 48439

Abstract

Purpose: To investigate the possible benefits of using the Pettibon corrective procedures to reduce the curvature associated with idiopathic scoliosis. These procedures are tested to determine potential effectiveness in a single patient.

Method: A patient with a 35º left convex thoracolumbar scoliosis was treated using the Pettibon corrective procedures. Initial and follow-up outcome measures included a Borg pain scale, a Functional Rating Index, a balance test, and radiographic analysis.

Results: After 6 weeks of treatment, the post treatment radiograph revealed a 20º left convex thoracolumbar scoliosis, as well as decreases in the Borg pain scale from 6 to 2, and Functional Rating Index score from 18/40 to 7/40 after the trial period. Her balance time increased from 18 seconds to 56 seconds.

Conclusion: In the present case, the Pettibon corrective procedures seemed to be effective at reducing the thoracolumbar scoliosis 15° (43%) after 6 weeks. The subjective and objective results of this case study warrant further such investigations.

Key Indexing Terms: Lumbar Spine; Posture; Rehabilitation; Scoliosis

Introduction

Scoliosis is a postural deformity characterized as a lateral curvature of the spine greater than 10º, measured by a Cobb angle on anteroposterior (AP) radiographs.[1] Recent literature has shown the negative effects of scoliosis on quality of life[2], however, conventional medical treatments, such as bracing, are not indicated[3] for curves between 35-45º. Several different causes of scoliosis have been hypothesized, including brain asymmetry,[4] a shortened spinal cord,[5] structural changes in the intervertebral disc and paraspinal musculature,[6] melatonin deficiency,[7] and neural axis deformities.[8]

It seems likely that any combination of these or other proposed etiologies may be present together.

With an understanding of the deleterious effects of abnormal mechanical spinal loading[9-11], conservative scoliosis treatment programs and management plans have been increasingly investigated. In chiropractic, spinal manipulative therapy has often been combined with other types of adjunctive therapies; including Pilates,[12] stretching and massage,[13] therapeutic exercises,[14] orthotics,[15] and other passive physiotherapeutic modalities such as ultrasound or electric stimulation.[16]

In this case study, we used the Pettibon corrective procedures to treat a 20-yr-old female with a left thoracolumbar scoliosis. These procedures have been previously reported in the chiropractic literature. However, these procedures have not been used in the treatment of idiopathic scoliosis. This case study will help to identify any potential role of the Pettibon corrective procedures in treating idiopathic scoliosis.

Case Report

History

A 20-yr-old female presented to a private spine clinic with a chief complaint of constant neck and low back pain. The subject was referred to this clinic by an existing patient, and presented with a previous diagnosis of adolescent idiopathic scoliosis. The subject previously sought help from a chiropractic physician, whereby the Cobb angle progressed during the course of treatment. She had previously been to a medical doctor, at which time she was diagnosed as having a thoracolumbar scoliosis, following a standing AP thoracolumbar radiograph. It was determined that she couldn't be helped and was prescribed an oral steroid for pain management. She presented to the author's clinic about 1 year after being treated by the medical doctor.

Examination

The subject initially filled out a Functional Rating Index. This index, described and tested by Feise et al[17], is a hybrid combination of the Neck Disability Index and the Oswestry Back Pain Index. The author chose this form because the patient presented with both low back and neck pain.

A static visual posture examination revealed a marked anterior right hip, a right thoracic translation, a high and anterior right shoulder, and a protruding right scapula.

An initial standing AP radiographic examination revealed a left convex thoracolumbar scoliosis of 35º (Figure 1). This measurement was taken from a Cobb angle drawn between the superior endplate of the 10th thoracic vertebra (T10) and the inferior endplate of the 4th lumbar vertebra (L4). The author utilized a sectional view of the thoracolumbar spine to reduce distortion by directing the central ray of the xray to the apex of the scoliotic curvature. Scoliotic curves above 30º have a significant rotational component.[18] Gocen et al[18] used a “true AP radiograph” as a more accurate way of determining the Cobb angle of a scoliotic curvature. For this view, the central ray is aimed at the level of the apical vertebra in the scoliotic curvature, so that the vertebral pedicles can be observed to be of equal size. Deacon et al[19] reported this technique to be more accurate for measuring curve size and evaluating spinal anatomy. However, this technique has not been tested for reliability in determining the success of a given treatment plan. Therefore, we decided to use the radiographic analysis outlined by Harrison et al.[20,21] This method has shown good to excellent reliability in terms of both patient positioning and structural analysis.

Additionally, at the onset of treatment, the patient rated her pain as a 6/10 on the Borg pain scale. A pain scale rating was taken at each visit for the entire 6-week trial period. The patient wrote down a number from 0-10, with 0 being “no pain” and 10 being “excruciating pain.” The patient was not allowed to see her previous pain scale scores. Finally, prior to intervention, the patient was asked to stand on a trampoline on 1 foot. Her time was recorded with eyes open. She was timed until her upper body started to lean or her elevated foot touched the floor. She was given 2 practice turns before timing the third. This test was conducted to assess balance and postural stability. Initially, her time registered as 18 seconds.

Intervention

The Pettibon corrective procedures[22] have been used to improve cervical spine alignment,[23,24] improve strength,[25] and reduce hyperlordosis.[26] The Pettibon procedures combine both manipulative and rehabilitative procedures, which may help to correct scoliosis through the same sensory, reflexive, somatosensory and neuromuscular mechanisms that have been shown to be defective in many scoliosis patients.[27]

Each visit consisted of the same procedures in the exact same order, starting with specific warm-up procedures, manipulative procedures, and finally rehabilitative procedures. The warm-up procedures consisted of Pettibon Wobble Chair® Exercises (Figure 2) and over-the-door manual cervical traction (Figure 3). The Pettibon Wobble Chair® is a chair designed to isolate the lumbar spine so that core training may take place. This chair has been previously illustrated in chiropractic literature.[23] However, the effects of the chair itself remain to be investigated. The Wobble Chair® exercises are performed by holding the head and shoulders still, moving only the pelvic girdle. The exercises consist of a front-to-back motion, a side-to-side motion, and clockwise/counterclockwise circles. Each exercise was performed 20 times, for a total of 80 repetitions at each office visit. The over-the-door manual cervical traction is performed with the patient facing the door in a standing position. This traction device allows the user to control the amount of tension placed on the spine, potentially decreasing the chance of muscle strain injury. This procedure was performed 20 times at a rate of 1 repetition per 7 seconds. The manipulative procedures consisted of a manual traction adjustment administered with the aid of a traction harness (Figure 4). This procedure is designed to mobilize several vertebral joints. An anterior thoracic adjustment was administered with the patient's thoracic cage rotated opposite to the rotational displacement. Side-posture lumbopelvic adjustments were delivered bilaterally to correct the rotational component of the pelvic misalignment. Cervical manipulation was performed both by hand and with a double-pronged percussive instrument to mobilize any cervical and upper thoracic fixations not addressed by the manual traction adjustment. Additionally, a supine blocking procedure was used to derotate the pelvis. This procedure was performed for 20 minutes at each office visit.

The rehabilitative procedures used were designed to retrain normal posture control through stimulation of the vestibulo-ocular system, cervicocollic and vestibulocollic reflexes, and the somatosensory system. These procedures included the use of an anterior adjustable headweight, a right shoulderweight, an unilateral front and back hipweight. Tjernstrom et al[28] indicated that postural control needs to be sufficiently challenged by stimulation or disturbance to induce active adaptive learning. They showed regular postural perturbations induce a long-term memory or motor strategy for adapting to that specific stimulation. [28] In our case study, the headweight theoretically serves this purpose, although this has not been specifically investigated. Theoretically, the headweight causes an anterior shift in the center of gravity of the head, thus exaggerating a forward head position. The head and neck postural reflexes, namely the vestibulocollic,[29] cervicocollic,[30] and cervical facet mechanoreceptors, respond to this type of postural stimulation by actively orienting the trunk's center of gravity under the head's center of gravity. The goal of these postural reflexes is to maintain efficient body stance and locomotion using the least energy expenditure as possible.[29-33] Figure 5 illustrates the bodyweighting position.

During each office visit, the subject wore both the anterior headweight and hipweight while balancing on one foot with eyes alternately opened and closed. This exercise was performed for 10 minutes following the manipulative procedures. The patient was instructed to wear the headweight and hipweight at home for 20 minutes twice daily. Positional traction, on 2 triangular foam blocks placed at the cervicothoracic and thoracolumbar junctions, was performed once daily immediately before bed for 20 minutes. Normally, the subject would have been on a treatment plan consisting of 3 times weekly for 4 weeks, to help ensure that proper ligament deformation and change and taken place. However, due to the long distance between the subject's residence and the clinic, the subject was treated only once weekly. Follow-up radiographs were taken after the 6th visit.

Re-Evaluation

After the 6th visit, post radiographs were taken to quantify improvements in the sagittal and frontal spinal curves. Additionally, the subject filled out a follow-up Functional Rating Index to compare to the original. The Functional Rating Index score dropped from an 18/40 initially to a 7/40 after 6 weeks. The Borg pain scale, rated a 6/10 at the onset of care, dropped to a 2/10 after 6 weeks. The pain scale scores, on a weekly basis, were reported as follows: 6/10, 6/10, 5/10, 3/10,3/10, 2/10.

On the post-treatment anteroposterior radiograph (Figure 1), the Cobb angle from the superior endplate of T10 to the inferior endplate of L4 was reduced from 35º to 20º. Her balance time on the trampoline improved to 56 seconds, after again giving her 2 practice turns.

Discussion

Caillliet[34] defines idiopathic scoliosis as an abnormal curvature of the spine of unknown etiology. Idiopathic scoliosis accounts for roughly 80% of all scoliosis cases.[34] There are a number of different proposed etiologies for idiopathic scoliosis, including neuromuscular, hormonal, and genetic.[1,7] Chiropractic physicians should focus upon reduction of the curvatures present in idiopathic scoliosis, until a definitive cause can be ascertained. Treating these curvatures alone may be a valid treatment goal, in light of the evidence illustrating the effects of these curvatures on developing pathology and disease.[9-11] Additionally, there may be a positive effect on quality of life in patients whose scoliotic curvatures are reduced.[2] Furthermore, there may be significant psychological issues involved with visual postural deformity.[35]

The possibility and effects of these issues on individual health status have not been sufficiently investigated to date.

Being that the patient's balance time was markedly improved, it seems that the head and body weighting system provided an adequate postural stimulus so that the task (balancing on one foot) became easier over time. These results are consistent with the conclusions made by Tjernstrom et al.[28] Practicing this task without the head and body weighting system, however, may have attained these same results. As we previously mentioned, alterations in postural control have been demonstrated in patients with scoliosis.[27] Whether these alterations are causes or effects remains unclear. However, future authors may want to consider how improving neuromuscular control of posture affects the curvatures present in scoliosis.

Given the study design, it is inappropriate to apply these results to other scoliosis cases. Moreover, the results achieved in this study, while comprised of both subjective and objective measures, may not be directly attributed to the treatment procedures. The placebo effect was not eliminated in this study. The subject continued the recommended treatment plan, which was initially scheduled over an 8-month period. Additional follow-up will be completed at that time and 2 years after treatment completion.

Conclusion

The Pettibon corrective procedures seemed to be effective at reducing a left thoracolumbar scoliosis by about 15° (43%), in this single case study. Based upon both the subjective and objective outcome measures in the present study, this treatment warrants further investigation in larger trials. A long-term follow-up is desirable.

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